APPENDIX B

Environmental Field Trip Report

Friant Dam Enlargement

ENVIRONMENTAL TRIP REPORT. FRIANT ENLARGEMENT

CHAPTER 1. INTRODUCTION

A team of environmental specialists completed an initial field trip to Friant Dam and Millerton Lake on May 29, 2002. The field trip was the first task in the environmental study of several potential surface storage options identified for initial review during the Upper San Joaquin River Basin Storage Investigation. For initial consideration, the environmental review focused mainly on construction and potential upstream impacts associated with surface storage sites. The site visit provided an opportunity to conduct preliminary reconnaissance of existing resources at the various locations for the following resource areas: terrestrial biology; aquatic biology and water quality; recreation; cultural resources; and land use.

This appendix includes a brief overview of the resource specialists' observations, trip logs prepared by team members, photographs taken during the field trip, and maps used to identify and review existing resources.

CHAPTER 2. SUMMARY OF FIELD OBSERVATIONS

This storage option would involve increasing the size of Friant Dam, thereby enlarging existing Millerton Lake. Existing facilities include: Friant Dam and ancillary facilities, Millerton Lake, recreation facilities, recreation and permanent residences, paved roads, unpaved roads, and trails.

Chapter 3. Botany

Vegetation around Millerton Lake is characterized by foothill woodland habitats, grassland, rock outcroppings, and riparian vegetation along the shoreline. This is very similar to Fine Gold Creek.

Adjacent hillsides have Foothill Pine- Blue Oak woodland with abundant grass and forb and shrub understory.

Some areas have open grassland and savannah type habitat conditions.

The amount of habitat lost depends on the height of the raised dam. Losses from the 140 foot raise could be substantial.

If vernal pools are present and would be impacted, the possibility of affected special status species could be moderate to high.

Chapter 4. Wildlife

Some perched water tables are evident along hillsides on both sides of the reservoir with riparian vegetation; however there are limited amounts of riparian or other wetland vegetation along the reservoir.

This area is heavily developed for recreation and has limited wildlife.

There may be some raptor foraging within the area and possibly deer activity.

Chapter 5. Aquatic Biology/Water Quality

The downstream end of reservoir contains gently sloping shoreline with well-developed riparian habitat in some areas and good fish nursery habitat in terminal portions of embayments.

Much of upper end of reservoir is steep-sided with little riparian vegetation and poor shoreline habitat.

An enlarged reservoir would probably enhance fisheries of the reservoir.

An enlarged reservoir could inundate a significant reach of the San Joaquin River upstream, with potentially adverse effects on hardhead, a California State Species of Special Concern, and other fish species in the River.

Inundation of the San Joaquin River could adversely affect spawning migrations of the reservoir's populations of American shad and striped bass. The shad population is the only known American shad population that is landlocked.

Inundation of abandoned mines, if any are present, could result in water quality degradation.

Re-operation of Millerton Reservoir could affect the operation of upstream reservoirs with potential effects on their fisheries and the fisheries of the San Joaquin River.

Chapter 6. Recreation

Millerton Lake is a major low elevation recreation destination and provides a variety of recreation opportunities including fishing, swimming, boating and water skiing.

A variety of developed recreation facilities are present along the reservoir margins, including campgrounds, day use areas and boat launches.

Dispersed use occurs along the entire shoreline and along the San Joaquin River, upstream of Millerton Lake.

Enlarging Millerton Lake would likely submerge most, if not all, of the developed recreation areas.

Enlarging Millerton Lake would also inundate a portion of the San Joaquin River which supports dispersed activities such as fishing and whitewater boating.

Chapter 7. Cultural Resources

The presence of a permanent water source (San Joaquin River), which formerly had salmon and other fishery resources, along with Blue Oak woodland, which was an attractive resource for acorns, and other riparian vegetation, contributed to a diverse resource base.

There is a high probability of prehistoric archaeological sites including BRM stations, hunting & fishing camps, and seasonal village sites.

Historic sites are likely in the area, associated with mining, hydroelectricity, reservoir development, and residential development. Contemporary ethnographic sensitivities may

relate to Table Mountain Rancheria (an American Indian reservation), which is located southeast of existing Friant Dam; probably just outside maximum potential inundation level ("high raise" option).

Chapter 8. Land Use

There are many large homes on the southeastern and southwestern shores.

Many of the homes appear to be year-round use although some may be vacation homes.

Many homes could be within the inundation areas depending on the height of the dam raise.

The road around the Lake may be inundated preventing access to the Lake.

Field Trip Log – Botany		
Trip Log Number:	S1	**Project No.:** 8004094
Dates:	May 29 and 30, 2002	
Site Name:	Friant Dam	
Location:	Millerton Lake from Friant Dam to Temperance Flat	
Prepared By:	Jeff Glazner/Barry Anderson/David Stevens	
Date:	June 5, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations)	
Attachments	
Photo Log	Yes
Photos	Yes
Topographic Map(s)	No

Field Observations:

Existing Facilities:

Existing Friant Dam and Millerton Lake.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

The reservoir is surrounded by grassland and spare blue oak woodland, rock

outcroppings, and riparian along the shoreline. Riparian vegetation occurs at seeps and springs and in tributary creeks along the reservoir. Little riparian habitat was seen along the reservoir itself, but pockets may develop in coves and other protected areas. Very similar to Fine Gold Creek. Adjacent hillside have Foothill Pine- Blue Oak woodland with abundant grass and forb, shrub understory. Some areas have open grassland and savannah type habitat conditions. Grasslands in basalt flows could have vernal pools with special status species.

Need for additional (engineering/hydrological, or other) information on measures

Geology or soils information

Spillway elevation and limits of inundation

Location of new electric transmission line (if needed)

Additional data needs (within each specific discipline)

CNDDB report

CNPS report

Ceres report

Field surveys for wetlands and special status species

Field Trip Log – Wildlife		
Trip Log Number:	S1	**Project No.:** 8004094
Dates:	May 29 and 30, 2002	
Site Name:	Friant Dam	
Location:	Millerton Lake from Friant Dam to Temperance Flat	
Prepared By:	Dave Stevens, Stephanie Murphy	
Date:	June 5, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations	
Attachments	
Photo Log	
Photos	
Topographic Map(s)	

Field Observations:

Existing Facilities:

Dam and powerhouse

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Foothill woodland habitats grassland, rock outcroppings and riparian along the shoreline. Very similar to Fine Gold Creek - Adjacent hillside have Foothill Pine- Blue Oak woodland with abundant grass and forb, shrub understory. Some areas have open grassland and savannah type habitat conditions. This is a heavily recreationalized area with limited wildlife. There may be some raptor foraging within the area and possibly deer activity.

Need for additional (engineering/hydrological, or other) information on measures

How much "excess" flow would be diverted to Fine Gold Creek?

How would proposal affect Kerckhoff Reservoir levels?

How would proposal affect seasonal storage levels at Kerckhoff and at Fine Gold?

Need description of conceptual water conveyance system, changes in Kerckhoff Reservoir management by season.

Need topo map showing potential changes in inundation levels at Kerckhoff in comparison to existing seasonal levels.

Additional data needs (within each specific discipline)

Need to coordinate with resource agency biologists and agency files on known distribution of sensitive species for this area.

Field Trip Log – Fish and Water Quality		
Trip Log Number:	S1	**Project No.:** 8004094
Dates:	May 29 and 30, 2002	
Site Name:	Friant Dam	
Location:	Millerton Lake from Friant Dam to Temperance Flat	
Prepared By:	Phil Unger	
Date:	June 7, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations	Millerton Lake from Friant Dam to Temperance Flat
Attachments	
Photo Log	No
Photos	Yes
Topographic Map(s)	Yes

Field Observations:

Existing Facilities:

Existing facilities include lower Millerton Reservoir, Friant Dam and ancillary facilities, and roads, marinas, campgrounds and private residences.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Millerton Lake is a large reservoir set in the lower foothills of the Sierras. The lower portion of the reservoir (downstream of Temperance Flat) is fairly open and mostly surrounded by low hills, while the upper portion (Temperance Flat and upstream) is narrow and mostly steep-sided. However, the lower portion immediately downstream of Temperance Flat is very narrow and steep-sided. This trip log covers the lower portion of the reservoir. The reservoir water level was high at the time of the field trip, so there was little unvegetated shoreline. Because of the high water level, much of the shoreline aquatic habitat was out of view. Partially submerged trees (mostly willows), which would provide excellent fish habitat, were observed in many areas (see Photo #?). The terminal portion of several embayments (e.g., Winchell Cove) had shallow, protected, gently sloping shorelines that probably provided good nursery habitat for several warm-water fish species.

Need for additional (engineering/hydrological, or other) information on measures

Need information on exact area that would be submerged by Millerton Reservoir at each proposed elevation.

Need the following bathymetry data for each elevation:

Mean depth for each month, April – October.

Mean surface area of shallow water habitat (less than 15 feet deep) in each month, April – October.

Mean rate of water level fluctuation for each month, April – October.

Also, how would re-operation of Millerton Reservoir affect the operation of upstream reservoirs?

Additional data needs (within each specific discipline)

Need the following information:

Principal fish species of Millerton Lake.

Water temperature, dissolved oxygen profiles and any other existing water quality data from Millerton Lake.

Information on the location and types of active and abandoned mines in the inundation zone of the proposed reservoir.

Field Trip Log - Recreation		
Trip Log Number:	S1	**Project No.:** 8004094
Dates:	May 29, 2002	
Site Name:	Friant Dam and Millerton Lake	
Location:	Millerton Lake from Friant Dam to Kerkhoff Reservoir	
Prepared By:	Sandra Perry	
Date:	June 3, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations)	Millerton Lake from Friant Dam to Kerkhoff Reservoir
Attachments	
Photo Log	No
Photos	No
Topographic Map(s)	Yes

Field Observations:

Existing Facilities:

This project would involve increasing the size of Friant Dam, thereby enlarging existing Millerton Reservoir (Lake). Existing facilities include: Friant Dam and ancillary facilities, Millerton Lake, recreation facilities, recreation and permanent residences, paved roads, unpaved roads, and trails. In addition, PG&E's Kerkhoff Powerhouses Nos. 1 and 2 are located at the upper end of the reservoir.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Millerton Lake is part of the Millerton Lake State Recreation Area and is also bordered by significant areas of public lands managed by the BLM. Millerton Lake is an important low elevation recreation destination and provides both water-oriented and land based recreation opportunities. Existing recreation facilities include:

Marinas

Boat Ramps

Developed Campgrounds

Developed Day Use Areas

Recreation Residences

Paved and unpaved roads

Trails

Increasing the size of Millerton Reservoir would submerge portions of the San Joaquin River upstream of Millerton Reservoir, potentially to Kerkhoff Reservoir. The area between Kerkhoff Reservoir and Millerton Reservoir is used by whitewater boaters and anglers.

Need for additional (engineering/hydrological, or other) information on measures

Need information on exact area that would be submerged by Millerton Reservoir at each proposed elevation.

Need the following information to determine whether travel along nearby roads and highways would be disrupted during the recreation season:

Timing of dam construction

Travel routes for construction equipment

Need to know how Millerton Reservoir operations would be affected after construction, including the magnitude and timing of lake level fluctuations.

Would re-operation of Millerton Reservoir affect the operation of upstream reservoirs?

Additional data needs (within each specific discipline)

Need the following recreation-related information:

Exact location of existing recreation facilities along the lake margins with respect to inundation areas

Additional information about whitewater boating use between Millerton and Kerkhoff Reservoirs

Use levels by activity for lake, river and land based recreation activities


Friant 7.5
Campground
Boat Launch
Campground
MILLERTON LAKE
STATE RECREATION AREA
Boat Launch
Boat Launches (5)
Picnic facilities
Housing
- Large Homes (Estates) surround Reservoir.
- Enlarged Reservoir would potentially flood access roads.
Campground

Field Trip Log – Cultural Resources		
Trip Log Number:	S1	**Project No.:** 8004094
Dates:	May 29 and 30, 2002	
Site Name:	Friant Dam	
Location:	Millerton Lake from Friant Dam to Temperance Flat	
Prepared By:	David White	
Date:	May 29, 30 2002	

Weather Conditions:	Hot & dry
Areas Covered (attach map with notations)	Friant Dam and Millerton Lake, aerial reconnaissance May 29. Millerton Lake and San Joaquin River by boat, May 30. Also see Trip Logs S2 and S4.
Attachments	
Photo Log	Yes – MWH 0205
Photos	Yes – nos. 7-11, 51-54
Topographic Map(s)	USGS Friant, Millerton Lake East, Millerton Lake West quads

Field Observations:

Existing Facilities:

Friant Dam. Residences, recreation facilities, roads.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Cultural resources:

Prehistoric: permanent water source (San Joaquin River) formerly had salmon, other

fishery resources; Blue Oak woodland was an attractive resource for acorns, and other riparian vegetation contributed to a diverse resource base. High probability of prehistoric archaeological sites including BRM stations, hunting & fishing camps, seasonal village sites.

Historic: Various sites likely, associated with mining, hydroelectricity, reservoir development, residential development.

Ethnographic: Table Mountain Rancheria (American Indian reservation) is located southeast of existing Friant Dam; probably just outside maximum potential inundation level ("high raise" option).

Need for additional (engineering/hydrological, or other) information on measures

Need precisely mapped footprint of reservoir, with various potential dam levels; also need footprint of all associated project-related ground disturbance areas, to include but not be limited to project offices and maintenance buildings, construction set-up and lay-down areas, access roads, electric transmission lines, water conveyance structures, and all other project facilities.

Additional data needs (within each specific discipline)

Need archaeological records search with California Historic Resources Inventory System (CHRIS) information center. Clearinghouse: Southern San Joaquin Valley Info Center, CSU-Bakersfield.

Need consultation with the BuRec cultural resource specialist regarding sites that may not be recorded with the CHRIS information center.

Also need brief review of archaeological and ethnographic literature pertaining to the area. Minimal level of effort: (1) to identify types of archaeological remains expected, time periods represented; and (2) to identify Native American tribes historically occupying the area, along with published information on major named villages or other ethnographic sites.

Field Trip Log – Land Use		
Trip Log Number:	S1	**Project No.:** 8004094
Dates:	May 29 and 30, 2002	
Site Name:	Friant Dam	
Location:	Millerton Lake from Friant Dam to Temperance Flat	
Prepared By:	Irina Torrey	
Date:	June 12, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations)	Millerton Lake from Friant Dam to Kerckhof Reservoir
Attachments	
Photo Log	Yes
Photos	Yes
Topographic Map(s)	No

Field Observations:

Existing Facilities:

This project would involve increasing the size of Friant Dam, thereby enlarging existing Millerton Reservoir (Lake). Existing facilities include: Friant Dam and ancillary facilities, Millerton Lake, recreation facilities, recreation and permanent residences, paved roads, unpaved roads, and trails.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Millerton Lake is a major resort and permanent and second home area and is surrounded by houses, many of substantial size. The majority of houses are concentrated on the southeastern shore but there are also many houses on the southwestern side of the Lake.

Need for additional (engineering/hydrological, or other) information on measures

Need information on exact area that would be submerged by Millerton Reservoir at each proposed elevation.

Need the following information to determine the length of travel disruption during construction and whether travel along nearby roads and highways would be disrupted during the recreation season:

Timing of dam construction

Travel routes for construction equipment

Additional data needs (within each specific discipline)

Need the following recreation-related information:

Exact location and number of homes along the lake margins with respect to inundation areas

Number of household units using the houses

Number of permanent and second homes within the inundation areas

Picture: P5290018 Millerton Lake (Friant Dam at right side of photo, view S, May 29 2002, early afternoon)

Picture: P5290019 Millerton Lake (Friant Dam right center in front of aircraft wing, view SE, May 29 2002, early afternoon)

Picture: P5290020 Millerton Lake (Friant Dam in left center of photo, view NE, May 29 2002, early afternoon)

Picture: P5290021 Millerton Lake (Friant Dam at left side of photo, view NW, May 29 2002, early afternoon)

Picture: P5290022 Millerton Lake (view W, May 29 2002, early afternoon)

Millerton Lake 5/30/02

Millerton Lake, housing on West shore 5/30/02

Millerton Lake, housing on Southwest shore 5/30/02

Millerton Lake, housing on Southwest shore 5/30/02

Millerton Lake, housing on Southwest shore 5/30/02

Millerton Lake, housing on northwest shore 5/30/02

Millerton Lake looking up Fine Gold Creek 5/30/02

Picture: P5290024 Air photo Millerton Lake looking north-east.

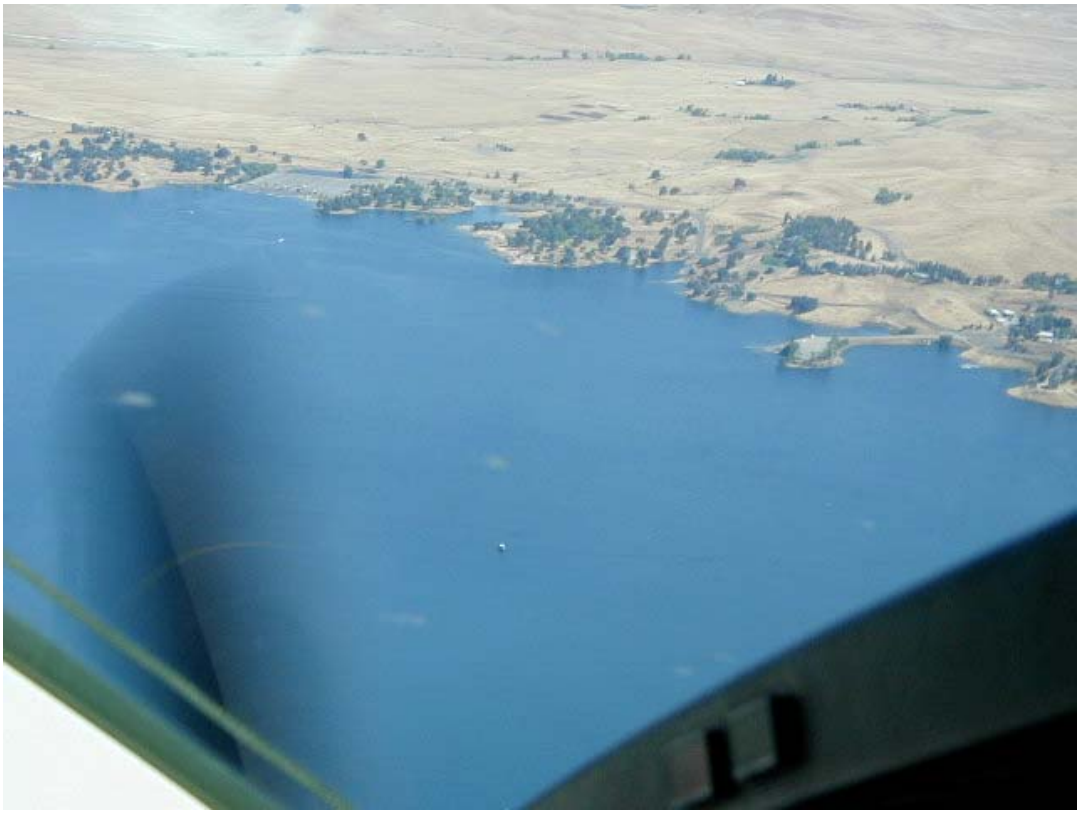
Picture: P5290025 Air photo south shore Millerton Lake boat ramp.

Picture: P5290026 Air photo Millerton Lake looking north-east.

Picture: P5290028 Air photo Millerton Lake looking north-east.

Picture: P5290029 Air photo of Millerton Lake.

Picture: P5290030 Air photo Millerton Lake and Friant Dam looking south-west.



Picture: P5290031 Air photo Millerton Lake looking south.

Picture: P5290032 Air photo Millerton Lake looking east.

Picture: P5290033 Air photo north shore Millerton Lake looking east.

Picture: P5290034 Air photo Millerton Lake looking east.

Picture: P5290035 Air photo north shore Millerton Lake.

Picture: P5290036 Air photo Millerton Lake looking south-west.

Picture: P5290037 Air photo Millerton Lake.

Picture: P5290038 Air Millerton Lake looking south-west.

Picture: P5290039 Air photo Millerton Lake.

Picture: P5290040 Air photo Millerton Lake looking south-west.

Picture: P5290041 Air photo Millerton Lake looking south-west.

Picture: P5290043 Air photo Millerton Lake looking north-west.

Picture: P5290044 Air photo Millerton Lake.

Picture: P5290045 Air photo Millerton Lake.

Picture: P5290090 Friant Dam dock area. South shoreline, looking west.

Picture: P5290091 Friant Dam dock area. South shoreline, looking north-east.

Picture: P5290092 Friant Dam dock area. South shoreline, looking north.

Picture: P5290093 Friant Dam dock area. South shoreline, looking north.

Picture: P5290094 Millerton Lake from boat near south shoreline looking north.

Picture: P5290095 Millerton Lake from boat near south shoreline looking north-west. Friant dam toward right of photo.

Picture: P5290096 Millerton Lake from boat near south shoreline looking west.

Picture: P5290097 Millerton Lake from near south shoreline looking south-west.

Picture: P5290099 Boat ramp on southern shoreline of Millerton Lake looking south-east.

Picture: P52900100 Winchell Cove Marina from boat on Millerton Lake.

Picture: P52900101 Winchell Cove Marina from boat on Millerton Lake.

Picture: P52900102 Point at Winchell Cove Marina from boat on Millerton Lake looking north-east.

Picture: P52900103 Homes on south side of Millerton Lake located just as reservoir narrows to San Joaquin River canyon.

Picture: P52900104 Homes on south side of Millerton Lake located just as reservoir narrows to San Joaquin River canyon.

Picture: P52900105 Homes on south side of Millerton Lake located just as reservoir narrows to San Joaquin River canyon.

Picture: P52900106 Homes on south side of Millerton Lake located just as reservoir narrows to San Joaquin River canyon.

Picture: P52900107 Homes on south side of Millerton Lake located just as reservoir narrows to San Joaquin River canyon.

Picture: P52900108 Homes on south side of Millerton Lake located just as reservoir narrows to San Joaquin River canyon.

Picture: P52900109 Homes on south side of Millerton Lake located just as reservoir narrows to San Joaquin River canyon.

Picture: P52900110 Log jam at upper reach of Millerton Lake.

Picture: P52900111 Log jam at upper reach of Millerton Lake.

Picture: P52900112 Friant Dam looking west from Millerton Lake boat.

Picture: P52900113 Friant Dam looking west from Millerton Lake boat.

Millerton Lake from boat launch, view NE, 5/30/02

Millerton Lake, drowned willows near boat launch, view NE, 5/30/02

Millerton Lake, drowned willows near boat launch, view NE, 5/30/02

Millerton Lake, Winchell Cove Marina, 5/30/02

Millerton Lake, Winchell Cove Marina, 5/30/02

Millerton Lake, drowned willows at upper end of Winchell Bay, 5/30/02

Millerton Lake, trees, houses, water, hills and sky, 5/30/02

Millerton Lake, trees, house, water, hills and sky, 5/30/02

Millerton Lake, Fine Gold Creek Arm from across the lake, view N, 5/30/02

Millerton Lake, Big Bend area, view E or NE towards Table Mt., 5/30/02

Millerton Lake, upper end of reservoir, 5/30/02

Millerton Lake, log jam at upper end of reservoir, 5/30/02

Millerton Lake, log jam at upper end of reservoir, 5/30/02

Millerton Lake, flooded trees in Temperance Flat Recreation Area, 5/30/02

Millerton Lake, flooded willows in Temperance Flat Recreation Area, 5/30/02

Millerton Lake, flooded willows in Temperance Flat Recreation Area, 5/30/02

Millerton Lake, downstream from Temperance Flat Recreation Area, view SE towards Table Mt., 5/30/02

THIS PAGE LEFT BLANK INTENTIONALLY

APPENDIX C

Cost Estimate Tables

Friant Dam Enlargement

CODE:D-8170

ESTIMATE WORKSHEET

SHEET__1___ OF __3___

FEATURE: 08-Jan-04

Raising Friant Dam
25 Foot Raise Option

WOID: UPSJS

PROJECT:
FRIANT DAM

DIVISION:

FILE: \\Ussac1s-muni1\Jobs\US_Bureau_Reclamation\IDIQ_01CS20210B\Upper_San_Joaquin_Phase_1\Documents\Surface Storage Option TMs\TM Friant\USBR

PLANT ACCT.	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	1	Diversion and care of river		1	LS	$500,000.00	$500,000
	2	Excavation, all classes, for dam foundation		145,000	CY	$12.00	$1,740,000
	3	Excavation, concrete		30,000	CY	$200.00	$6,000,000
	4	Backfill		63,300	CY	$5.00	$316,500
	5	RCC in dam		270,700	CY	$45.00	$12,181,500
	6	Concrete facing elements		34,500	CY	$120.00	$4,140,000
	7	Concrete cap on top of dam		3,900	CY	$250.00	$975,000
	8	Leveling concrete in dam foundation		5,000	CY	$200.00	$1,000,000
	9	Concrete for drainage gallery (No gallery in this option)		N/A	CY		
	10	Concrete in spillway crest and piers		13,600	CY	$240.00	$3,264,000
	11	Concrete in spillway training walls		4,300	CY	$320.00	$1,376,000
	12	Concrete in stilling basin walls		3,200	CY	$340.00	$1,088,000
	13	Concrete in stilling basin floors and aprons		24,900	CY	$185.00	$4,606,500
	14	Concrete in sidewalks, curbs and parapets on dam		3,200	CY	$370.00	$1,184,000
	15	Furnishing and handling cement		62,400	TONS	$100.00	$6,240,000
	16	Furnishing and handling reinforcement		10,730,000	LB	$0.60	$6,438,000
	17	Installing new track rails for gantry cranes		85,000	LB	$3.50	$297,500
	18	Dismantling, modifying and reinstalling gantry cranes		1	LS	$1,000,000.00	$1,000,000
		Subtotal (sheet 1 of 3)					$52,347,000

QUANTITIES		PRICES	
BY S. Higinbotham	CHECKED	BY T. Artichoker	CHECKED
DATE PREPARED	APPROVED	DATE 01/08/04	PRICE LEVEL Appraisal

CODE:D-8170

ESTIMATE WORKSHEET

SHEET__2__ OF __3___

FEATURE: 08-Jan-04

Raising Friant Dam
25 Foot Raise Option

WOID: UPSJS

PROJECT:
FRIANT DAM

DIVISION:

FILE: C:\Artichoker\Appraisal-Feasibility Estimates\Friant Dam Alternatives\[Friant25.wk4]B

PLANT ACCT.	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	19	Moving, modifying and resetting gantry cranes		1	LS	$0.00	$0
		(assume redundant and deleted)					
	20	Installing outlet pipe extensions		140,000	lb	$2.50	$350,000
	21	F & I new wheel gates and outlet valves		1	LS	$4,000,000.00	$4,000,000
	22	Dismantling existing drum gate		1	LS	$405,000.00	$405,000
	23	Dismantling existing crest gates		1	LS	$150,000.00	$150,000
	24	Dismantling control system for crest gates		1	LS	$13,000.00	$13,000
	25	Reinstalling crest gates		1	LS	$165,000.00	$165,000
	26	Reinstalling control system for crest gates		1	LS	$50,000.00	$50,000
	27	Furnishing and installing one new crest gate		1	LS	$1,500,000	$1,500,000
	28	Installing control system for new crest gate		1	LS	$25,000.00	$25,000
	29	Furnishing and installing flat drains		54,000	LF	$22.00	$1,188,000
	30	Setup for foundation drain drilling		358	EA	$200.00	$71,600
	31	Foundation drain drilling outside the gallery		93,000	FT	$35.00	$3,255,000
	32	Excavation		15,000	CY	$9.00	$135,000
	33	U/S slope protection		7,300	CY	$15.00	$109,500
	34	D/S slope protection		4,900	CY	$15.00	$73,500
		Subtotal (sheet 2 of 3)					$11,490,600

QUANTITIES		PRICES	
BY S. Higinbotham	**CHECKED**	**BY** T. Artichoker	**CHECKED**
DATE PREPARED	**APPROVED**	**DATE** 01/08/04	**PRICE LEVEL** Appraisal

CODE:D-8170

ESTIMATE WORKSHEET

SHEET__3__ OF __3___

FEATURE: 08-Jan-04

Raising Friant Dam
25 Foot Raise Option

WOID: UPSJS

PROJECT:
FRIANT DAM

DIVISION:

FILE: \\Ussac1s-muni1\Jobs\US_Bureau_Reclamation\IDIQ_01CS20210B\Upper_San_Joaquin_Phase_1\Documents\Surface Storage Option TMs\TM Friant\USBR

PLANT ACCT.	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	35	Zone 3 shell material:					
		(Sand, Gravel, Cobbles, Boulders from Stockpile)		114,000	CY	$7.00	$798,000
	36	Zone 2 filter material					
		(Processed SP material)		60,000	CY	$25.00	$1,500,000
	37	Zone 1 material					
		(Select CL, SC, SM, ML and GC materials)					
		Core material		129,000	CY	$10.00	$1,290,000
		Subtotal (sheet 1)					$52,347,000
		Subtotal (sheet 2)					$11,490,600
		Subtotal (sheet 3)					$3,588,000
		Subtotal					$67,425,600
	40	Mobilization		(+/-)		5%	$3,400,000
		Subtotal					**$70,825,600**
		Unlisted Items		(+/-)		15%	$10,174,400
		Contract Cost					**$81,000,000**
		Contingencies		(+/-)		25%	$19,000,000
		Field Cost					**$100,000,000**

QUANTITIES		PRICES	
BY S. Higinbotham	CHECKED	BY T. Artichoker	CHECKED
DATE PREPARED	APPROVED	DATE 01/08/04	PRICE LEVEL Appraisal

CODE:D-8170

ESTIMATE WORKSHEET

SHEET__1__ OF __3___

FEATURE: 08-Jan-04

Raising Friant Dam
60 Foot Raise Option

WOID: UPSJS

PROJECT:
FRIANT DAM

DIVISION:

FILE: \\Ussac1s-muni1\Jobs\US_Bureau_Reclamation\IDIQ_01CS20210B\Upper_San_Joaquin_Phase_1\Documents\Surface Storage Option TMs\TM Friant\USBR

PLANT ACCT.	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	1	Diversion and care of river		1	LS	$750,000.00	$750,000
	2	Excavation, all classes, for dam foundation		355,400	CY	$10.00	$3,554,000
	3	Excavation, concrete		30,000	CY	$200.00	$6,000,000
	4	Backfill		144,000	CY	$5.00	$720,000
	5	RCC in dam		934,000	CY	$40.00	$37,360,000
	6	Concrete in spillway crest and piers		13,600	CY	$240.00	$3,264,000
	7	Concrete in spillway training walls		4,300	CY	$320.00	$1,376,000
	8	Concrete in stilling basin walls		3,200	CY	$340.00	$1,088,000
	9	Concrete in stilling basin floors and aprons		24,900	CY	$185.00	$4,606,500
	10	Concrete in sidewalks, curbs and parapets on dam		3,200	CY	$370.00	$1,184,000
	11	Furnishing and handling cement		208,000	TONS	$95.00	$19,760,000
	12	Furnishing and handling reinforcement		7,380,000	LB	$0.60	$4,428,000
	13	Installing new track rails for gantry cranes		85,000	LB	$3.50	$297,500
	14	Dismantling, modifying and reinstalling gantry cranes		1	LS	$1,000,000.00	$1,000,000
	15	Moving, modifying and resettling gantry cranes (assume redundant and deleted)		1	LS	$0.00	$0
	16	Installing outlet pipe extensions		335,000	LB	$2.50	$837,500
	17	Replacing wheel gates and outlet valves		1	LS	$4,000,000	$4,000,000
	18	Dismantling existing drum gate		1	LS	$405,000.00	$405,000
		Subtotal (1 of 3)					$90,630,500

QUANTITIES		PRICES	
BY: S. Higinbotham	CHECKED	BY: T. Artichoker	CHECKED
DATE PREPARED	APPROVED	DATE: 01/08/04	PRICE LEVEL: Appraisal

CODE:D-8170

ESTIMATE WORKSHEET

SHEET__2__ OF __3___

FEATURE: 08-Jan-04

Raising Friant Dam
60 Foot Raise Option

WOID: UPSJS

PROJECT:
FRIANT DAM

DIVISION:

FILE: C:\Artichoker\Appraisal-Feasibility Estimates\Friant Dam Alternatives\[FRIANT60.WK4]B

PLANT ACCT.	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	19	Dismantling existing crest gates		1	LS	$150,000.00	$150,000
	20	Dismantling control system for crest gates		1	LS	$13,000.00	$13,000
	21	Reinstalling crest gates		1	LS	$165,000.00	$165,000
	22	Reinstalling control system for crest gates		1	LS	$50,000.00	$50,000
	23	Furnishing and installing one new crest gate		1	LS	$1,500,000	$1,500,000
	24	Installing control system for new crest gate		1	LS	$25,000.00	$25,000
	25	Furnishing and installing flat drains		54,000	LF	$22.00	$1,188,000
	26	Setup for foundation drain drilling		327	EA	$200.00	$65,400
	27	Foundation drain drilling outside the gallery		210,000	FT	$35.00	$7,350,000
	28	Clearing and grubbing 6" to waste		45	AC	$3,500.00	$157,500
	29	Excavation		405,000	CY	$7.50	$3,037,500
	30	U/S slope protection		199,000	CY	$10.00	$1,990,000
	31	D/S slope protection		193,000	CY	$10.00	$1,930,000
	32	Zone 3 material:					
		(Sand, Gravel, Cobbles, Boulders from Borrow)					
		U/S		1,230,000	CY	$11.00	$13,530,000
		D/S		502,000	CY	$11.00	$5,522,000
	33	Filter material					
		(Processed SP material)					
		U/S		154,000	CY	$18.00	$2,772,000
		D/S		205,000	CY	$18.00	$3,690,000
		Subtotal (2 of 3)					$43,135,400

QUANTITIES		PRICES	
BY S. Higinbotham	CHECKED	BY T. Artichoker	CHECKED
DATE PREPARED	APPROVED	DATE 01/08/04	PRICE LEVEL Appraisal

CODE:D-8170

ESTIMATE WORKSHEET

SHEET__3__ OF __3___

FEATURE: 08-Jan-04

Raising Friant Dam
60 Foot Raise Option

WOID: UPSJS

PROJECT:
FRIANT DAM

DIVISION:

FILE: \\Ussac1s-muni1\Jobs\US_Bureau_Reclamation\IDIQ_01CS20210B\Upper_San_Joaquin_Phase_1\Documents\Surface Storage Option TMs\TM Friant\USBR

PLANT ACCT.	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	34	Zone 1 material					
		(Select CL, SC, SM, ML and GC materials)					
		Core material		972,000	CY	$8.00	$7,776,000
	35	D/S Filter and drainage blanket:					
		Processed GP materials		366,000	CY	$18.00	$6,588,000
		12-in dia perforated, corrug. HDPE drain pipe		3,800	LF	$12.00	$45,600
		Manholes, 5-ft dia, 20-ft high		50	EA	$7,000.00	$350,000
		Weirs		50	EA	$700.00	$35,000
		Foundation Treatment (grout curtain)		1	LS	$1,100,000.00	$1,100,000
	36	Concrete facing elements (upstream and downstream)		116,000	CY	$80.00	$9,280,000
	37	Concrete cap on top of dam		5,000	CY	$250.00	$1,250,000
	38	Leveling concrete in dam foundation		5,500	CY	$200.00	$1,100,000
	39	Concrete for drainage gallery		6,000	CY	$300.00	$1,800,000
		Subtotal (1 of 3)					$90,630,500.00
		Subtotal (2 of 3)					$43,135,400
		Subtotal (3 of 3)					$29,324,600
		SUBTOTAL					$163,090,500
	40	Mobilization		(+/-)		5%	$8,200,000
		Subtotal					**$171,290,500**
		Unlisted Items		(+/-)		15%	$23,709,500
		Contract Cost					**$195,000,000**
		Contingencies		(+/-)		25%	$55,000,000
		Field Cost					**$250,000,000**

QUANTITIES		PRICES	
BY: S. Higinbotham	CHECKED	BY: T. Artichoker	CHECKED
DATE PREPARED	APPROVED	DATE: 01/08/04	PRICE LEVEL: Appraisal

CODE:D-8170 **ESTIMATE WORKSHEET** SHEET__1__ OF __3___

FEATURE: 08-Jan-04

Raising Friant Dam
143.75 Foot Raise Option

WOID: UPSJS

PROJECT:
FRIANT DAM

DIVISION:

FILE: \\Ussac1s-muni1\Jobs\US_Bureau_Reclamation\IDIQ_01CS20210B\Upper_San_Joaquin_Phase_1\Documents\Surface Storage Option TMs\TM Friant\USBR

PLANT ACCT.	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	1	Diversion and care of river		1	LS	$1,000,000.00	$1,000,000
	2	Excavation, all classes, for dam foundation		900,000	CY	$10.00	$9,000,000
	3	Excavation, concrete		30,000	CY	$200.00	$6,000,000
	4	Backfill		300,000	CY	$4.50	$1,350,000
	5	RCC in dam		3,880,000	CY	$33.00	$128,040,000
	6	Concrete in spillway crest and piers		13,600	CY	$240.00	$3,264,000
	7	Concrete in spillway training walls		4,300	CY	$320.00	$1,376,000
	8	Concrete in stilling basin walls		3,200	CY	$340.00	$1,088,000
	9	Concrete in stilling basin floors and aprons		24,900	CY	$185.00	$4,606,500
	10	Concrete in sidewalks, curbs and parapets on dam		6,300	CY	$370.00	$2,331,000
	11	Furnishing and handling cement		652,000	TONS	$90.00	$58,680,000
	12	Furnishing and handling reinforcement		7,845,000	LB	$0.60	$4,707,000
	13	Installing new track rails for gantry cranes		85,000	LB	$3.50	$297,500
	14	Dismantling, modifying and reinstalling gantry cranes		1	LS	$1,000,000.00	$1,000,000
	15	Moving, modifying and resettling gantry cranes (assume redundant and deleted)		1	LS	$0.00	$0
	16	Installing outlet pipe extensions		915,000	LB	$2.00	$1,830,000
	17	Replacing wheel gates and outlet valves		1	LS	$4,000,000	$4,000,000
	18	Dismantling existing drum gate		1	LS	$405,000.00	$405,000
		Subtotal (1 of 3)					$228,975,000

QUANTITIES		PRICES	
BY S. Higinbotham	CHECKED	BY T. Artichoker	CHECKED
DATE PREPARED	APPROVED	DATE 01/08/04	PRICE LEVEL Appraisal

CODE:D-8170

ESTIMATE WORKSHEET

SHEET__2__ OF __3___

FEATURE: 08-Jan-04

Raising Friant Dam
143.75 Foot Raise Option

WOID: UPSJS

PROJECT:
FRIANT DAM

DIVISION:

FILE: \\Ussac1s-muni1\Jobs\US_Bureau_Reclamation\IDIQ_01CS20210B\Upper_San_Joaquin_Phase_1\Documents\Surface Storage Option TMs\TM Friant\USBR

PLANT ACCT.	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	19	Dismantling existing crest gates		1	LS	$150,000.00	$150,000
	20	Dismantling control system for crest gates		1	LS	$13,000.00	$13,000
	21	Reinstalling crest gates		1	LS	$165,000.00	$165,000
	22	Reinstalling control system for crest gates		1	LS	$50,000.00	$50,000
	23	Furnishing and installing one new crest gate		1	LS	$1,500,000	$1,500,000
	24	Installing control system for new crest gate		1	LS	$25,000.00	$25,000
	25	Furnishing and installing flat drains		54,000	LF	$22.00	$1,188,000
	26	Setup for foundation drain drilling		327	EA	$200.00	$65,400
	27	Foundation drain drilling, outside the gallery		262,000	FT	$33.00	$8,646,000
	28	Clearing and grubbing 6" to waste		165	AC	$3,500.00	$577,500
	29	Excavation		1,500,000	CY	$7.00	$10,500,000
	30	U/S slope protection		572,000	CY	$9.00	$5,148,000
	31	D/S slope protection		643,000	CY	$9.00	$5,787,000
	32	Zone 3 material:					
		(Sand, Gravel, Cobbles, Boulders from Borrow)					
		U/S		5,602,000	CY	$8.00	$44,816,000
		D/S		3,914,000	CY	$8.00	$31,312,000
	33	Filter material					
		(Processed SP material)					
		U/S material		484,000	CY	$16.00	$7,744,000
		D/S material		632,000	CY	$16.00	$10,112,000
		Subtotal (2 of 3)					$127,798,900

QUANTITIES		PRICES	
BY: S. Higinbotham	CHECKED	BY: T. Artichoker	CHECKED
DATE PREPARED	APPROVED	DATE: 01/08/04	PRICE LEVEL: Appraisal

CODE:D-8170

ESTIMATE WORKSHEET

SHEET__3__ OF __3___

FEATURE: 08-Jan-04

Raising Friant Dam
143.75 Foot Raise Option

WOID: UPSJS

PROJECT:
FRIANT DAM

DIVISION:

FILE: \\Ussac1s-muni1\Jobs\US_Bureau_Reclamation\IDIQ_01CS20210B\Upper_San_Joaquin Phase 1\Documents\Surface Storage Option TMs\TM Friant\USBR

PLANT ACCT.	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	34	Zone 1 material					
		(Select CL, SC, SM, ML and GC materials)					
		Core material		3,358,000	CY	$7.00	$23,506,000
	35	D/S Filter and drainage blanket:					
		Processed GP materials		1,410,000	CY	$17.00	$23,970,000
		12-in dia perforated, corrug. HDPE drain pipe		14,000	LF	$12.00	$168,000
		Manholes, 5-ft dia, 20-ft high		50	EA	$7,000.00	$350,000
		Weirs		50	EA	$700.00	$35,000
		Foundation Treatment (grout curtain)		1	LS	$1,100,000.00	$1,100,000
	36	Concrete facing elements (upstream and downstream)		116,000	CY	$80.00	$9,280,000
	37	Concrete cap on top of dam		5,000	CY	$250.00	$1,250,000
	38	Leveling concrete in dam foundation		13,000	CY	$200.00	$2,600,000
	39	Concrete for drainage gallery		6,000	CY	$300.00	$1,800,000
		Subtotal (1 of 3)					$228,975,000.00
		Subtotal (2 of 3)					$127,798,900
		Subtotal (3 of 3)					$64,059,000
		SUBTOTAL					$420,832,900
	40	Mobilization		(+/-)		5%	$21,000,000
		Subtotal					**$441,832,900**
		Unlisted Items		(+/-)		15%	$68,167,100
		Contract Cost					**$510,000,000**
		Contingencies		(+/-)		25%	$130,000,000
		Field Cost					**$640,000,000**

QUANTITIES		PRICES	
BY S. Higinbotham	CHECKED	BY T. Artichoker	CHECKED
DATE PREPARED	APPROVED	DATE 01/08/04	PRICE LEVEL Appraisal

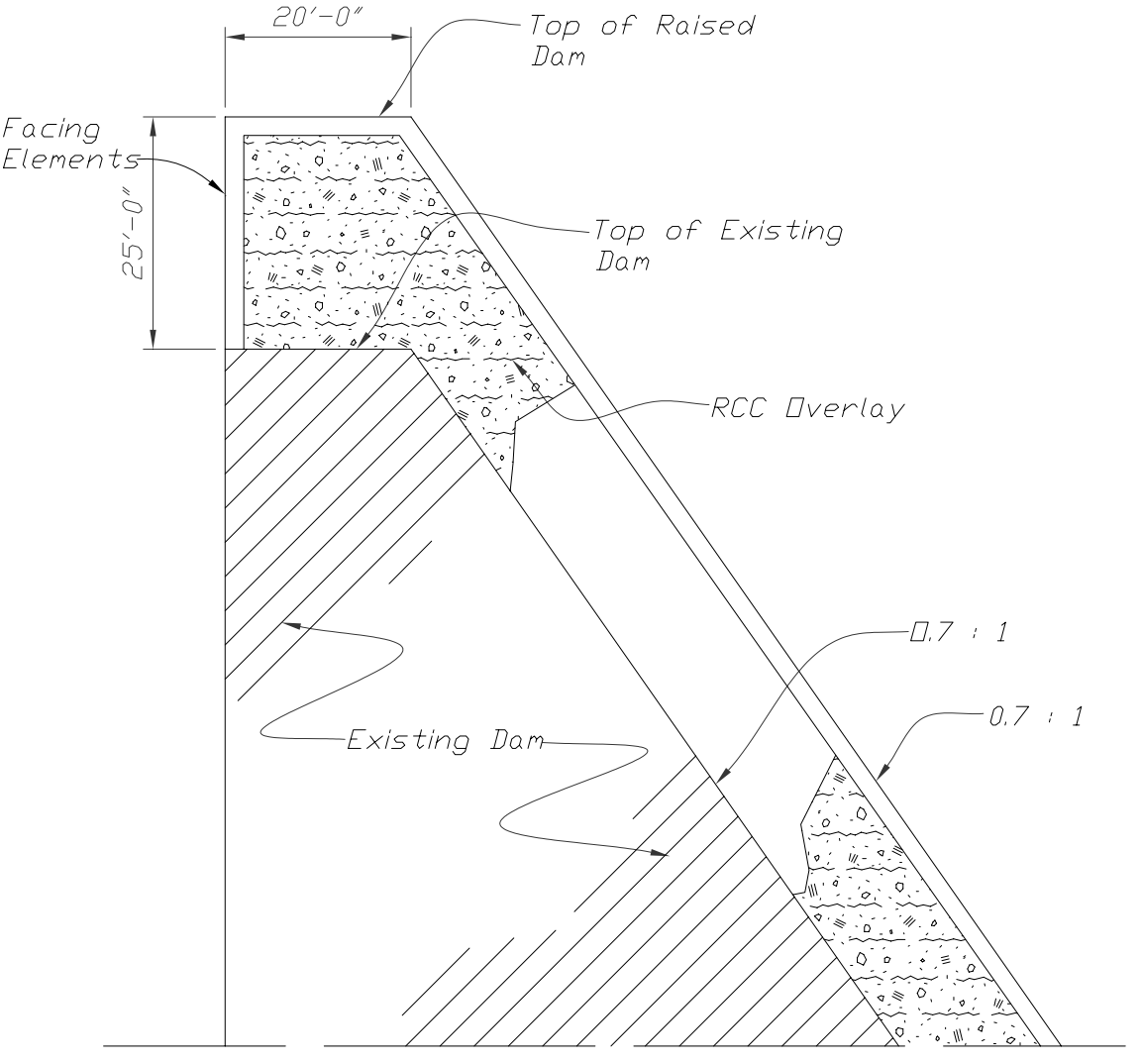
THIS PAGE LEFT BLANK INTENTIONALLY

APPENDIX D

Dam Cross Section Profile

Friant Dam Enlargement

Appendix D contains a preliminary, pre-feasibility level drawing illustrative of the Friant Dam enlargement method under consideration. While only the 25 foot raise option is shown, the same basic approach is contemplated for a larger raise.



FRIANT DAM - 25' RAISE

FIGURE 1

APPENDIX E

Climate Data

Friant Dam Enlargement

FRIANT GOVERNMENT CAMP, CALIFORNIA (043261)

Period of Record Monthly Climate Summary

Period of Record : 7/ 1/1948 to 3/31/2003

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	55.2	61.2	66.0	73.9	84.0	92.9	100.0	98.5	92.3	81.6	66.6	55.9	77.3
Average Min. Temperature (F)	36.4	39.5	40.9	43.3	48.9	55.2	60.5	59.2	55.8	49.1	41.4	36.2	47.2
Average Total Precipitation (in.)	2.70	2.45	2.42	1.29	0.47	0.16	0.01	0.01	0.24	0.67	1.64	2.15	14.22
Average Total SnowFall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 99.4% Min. Temp.: 99.4% Precipitation: 99.4% Snowfall: 99.4% Snow Depth: 99.4%

Source: Western Regional Climate Center, Desert Research Institute
(http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?cafria+nca)

THIS PAGE LEFT BLANK INTENTIONALLY